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NARRATIVE LITERATURE REWIEW

Myopization associated with the use of pregabalin

Miopização relacionada ao uso de Pregabalina

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ABSTRACT

A review of the action of drugs that act on GABAergic pathways and comparison of their side effects on lens accommodation and consequent refractive alterations, focusing on myopization associated with the use of pregabalin.

Keywords: Accommodation, Ocular; Myopia; Pregabalin.

RESUMO

Revisão sobre a atuação de medicamentos que agem em vias gabaérgicas, comparando seus efeitos colaterais na acomodação do cristalino e consequente mudança na refração, com ênfase na miopização relacionada ao uso de pregabalina.

Palavras-chave: Acomodação Ocular; Miopia; Pregabalina.

RESUMEN

Revisión sobre la actuación de medicamentos que actúan en vías gabaérgicas, comparando sus efectos colaterales en la acomodación del cristalino y consecuente cambio en la refracción, con énfasis en la miopización relacionada al uso de pregabalina.

Palabras Clave: Acomodación Ocular; Miopía; Pregabalina.

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INTRODUCTION

Several classes of medications, such as antipsychotics, antidepressants, and anticholinergics[1], can alter lens accommodation, pupil diameters, and extrinsic ocular movements (worsening of near/far vision and/or diplopia).

Myopization is a well-known side effect of sulfonamides, such as topiramate. As a direct reaction to the use of sulfonamides, the most commonly reported mechanism is formation of ciliary body edema[2,3] anterior to the lens, observed using ultrasound biomicroscopy[2]. In such cases, a narrowing of the angle between the iris and cornea[2,3] has been reported in addition to myopization of 4.0 diopters or more.

THEORETICAL/METHODOLOGICAL REVIEW

Several article (two of them at this article´s bibliography) have reported the visual side effects of topiramate; however, the hypotheses about the gamma-aminobutyric acid (GABA)-ergic circuits that could partially elucidate the phenomena observed in lens accommodation have not been adequately formulated and explained. In addition to topiramate, other drugs such as pregabalin tend to act on neuronal GABA circuits.

Pregabalin and topiramate act on the GABAergic neuronal circuits; the former is a GABA agonist (does not contain sulfonamide) and the latter is an agonist of GABA circuit functions. The absence of sulfonamide in pregabalin indicates that it does not have the same mechanism of visual turbidity as topiramate, i.e., it cannot alter the ciliary body by directly acting on it. In the case of topiramate, the influence of the GABAergic circuits on the ciliary body cannot be immediately eliminated in parallel with the side effect caused by the direct action of the drug.

The presence of transient blurred vision and other alterations related to visual acuity[4] has been reported under the "post-marketing experience"[4] section of the package insert of the reference drug "Lyrica®" (pregabalin)[4]. This drug is used to stabilize the neuronal membrane, acting as a GABAergic agonist, in the treatment of several pathologies that cause neuropathic pain. The mechanism underlying these visual changes has not been well elucidated, and no article specifically addressing pregabalin was retrieved from the literature.

Considering the encephalic distribution of GABAergic neurons and their inhibitory function, it is known that one of the GABA circuits passes through the reticulated black substance and extends to the superior colliculus. With the pretectal nuclei, optic tract fibers[5,6] bilaterally travel to the synapse through the superior colliculus on each side. Through the posterior commissure, these nuclei bilaterally protrude into the visceral parasympathetic preganglionic Edinger–Westphal nuclei. The axons from the Edinger–Westphal nuclei follow the path of the third pair to synapse in the ciliary ganglion and to further innervate the pupil-constriction muscles. In addition to the photomotor pupil reflex, the Edinger–Westphal nuclei participate in the accommodation reflex. Further, the superior colliculus is involved in signal transmission to the reticular formation of the paramedian part of the bridge, participating in the coordination of the action of the medial and lateral rectus muscles during conjugate horizontal gaze.

CONCLUSION

Due to the drug-induced alterations in the GABAergic circuits, many of which use the superior colliculus as a hub, it can be hypothesized that they participate in the alterations perceived with the use of drugs that affect the GABAergic pathways, especially those of ophthalmologic relevance, which pass through or are related to such colliculi: photomotor reflex, accommodation reflex, and conjugated movements.

Myopization and other ametropia could occur as a result of accommodative changes. Further, low vision is worsened in cases of concomitant pupillary alterations (increase in astigmatism and spherical aberration) and/or diplopia.

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